

## REMARKS

Reconsideration of the above-identified patent application in view of the remarks following is respectfully requested.

Claims 1-35 are in this case. Claims 1-6, 8, 10-15, 17 and 19-35 have been rejected. Claims 7, 9, 16 and 18 have been objected to.

The Examiner's rejection of the above-mentioned claims is respectfully traversed. However, in order the expedite allowance and to more clearly point out and differentiate the invention from the newly cited prior art, the Applicant has cancelled claims 1-35 and has replaced them with a new set of claims 36-55. In particular, the Applicant has inserted the key feature of a "local carrier concentration column operative to have its carrier concentration changed electrically" into claims 43-55.

The Applicant gratefully acknowledges the conditional allowance of claims 7, 9, 16 and 18. New independent claims 36 and 40 have been drafted to match the requirement to amend claims 7 and 16 to include all the limitations of their respective original base claims and original intervening claims. New claims 37-39 and 41-54 have support throughout the specification (the references follow US Publication No. 2004/0021193 to Nathan et al.):

Claims 37, 38 and 41: FIG. 5 b-d, FIG. 6 and their description.

Claim 39: The description of FIG. 8 in [0064]

Claim 42: Claim 3: FIG. 6 and its description

Claim 43: FIG. 5 and its description starting in [0060]

Claim 44 and 45: [0060], [0066], [0067]

Claim 46: [0057]

Claim 47: FIGS. 5, 8 and [0067]

Claims 48 and 49: [0057]

Claim 50: [0060]

Claim 51: [0062]

Claim 52: The description of FIG. 8 in [0064]

Claim 53: FIG. 5d, FIG. 7

Claim 54: FIG. 2 and its description, [0070]

Claim 55: [0070].

### § 102(b) Rejections

The Examiner has rejected claims 1-3, 10-12, 19, 20, 23-27 and 32-34 as being anticipated by US Patent No. 6,058,127 to Joannopoulos et al. The Examiner has also rejected claims 1-3, 10, 11, 19, 20, 23, 25-27 and 32-34 as being anticipated by U.S. Patent Publication No. 2002/0172456 to Hosomi et al. The Examiner's rejection is respectfully traversed. Joannopoulos's defect is a micro-cavity containing non-linear materials. The frequency of the resonant mode is tuned by varying the refractive index of the non-linear material. As stated by him "this can be accomplished, for example, by sending current through or applying voltage across the crystal, or by shining light upon it" (col. 3, lines 30-35). Even though "the index needs to be changed only in the vicinity of the defect in order to tune the frequency of the mode" (col. 3, lines 55-57) Joannopoulos's description makes it abundantly clear that the electrical current or voltage are applied to the entire crystal. The Applicant submits that while the language of the original claims may have not clarified the "local" means used to achieve a local carrier concentration column, this is indeed a key inventive feature herein, and inserted in the new set of claims.

As for Hosomi, his invention uses the effect of dispersion, which is totally different from the micro-cavity resonance shifts of the present invention. The differences were explained by the Applicant in the previous Office Action Response with reference to Shirane, US Patent Publication No 2002/0146196. As stated therein: "Shirane's invention is based on carrier effects on "energy bands", which are nothing but dispersion curves. It is well known in the art that a dispersion curve in a periodic structure and a resonance of a small (micro) cavity represent two completely different and totally unrelated physical phenomena. Knowledge of effects of injected carriers on dispersion properties cannot in any way be used to anticipate the devices based on resonance effects of the present invention, as recited in the claims". Therefore, the use of Hosomi's structure and principle of operation cannot anticipate the present invention.

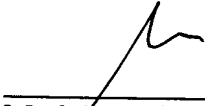
### § 103 Rejections

The Examiner has rejected claims 1-6, 8, 10, 11, 13-15, 17 and 19-34 as being unpatentable over US Patent Publication No. 2002/014196 to Shirane et al. in view of US Patent No. 6,512,866 to Fan et al. The applicant has discussed extensively in his previous Response the features of Shirane et al. Shirane's invention discloses devices that operate on the principle of dispersion changes under an electrical field, and not resonant changes occurring in a single isolated micro-cavity. Fan discloses local defects (microcavities) used in coupling schemes between waveguides. His cavities are used as coupling elements between the waveguides to produce channel dropping filters (CDF). On-off switching functionalities are produced by changing the absorption of a micro-cavity from maximal to minimal and vice versa, using electrical or optical mechanisms. In all the embodiments, the principle is to switch between full absorption to minimal absorption, i.e. in and out of resonance. Fan's disclosure repeatedly states that electrodes contact a microcavity (FIG. 23A, col. 20, lines 28-30, col. 21, lines 42-47), which in the description is represented by posts with a sub-micrometer diameter. There is no enabling description of how a working contact may be applied to a single post, which in fact is practically impossible. Moreover, simple attachment of electrodes to a uniform semiconductor post and application of voltage result in uniform currents, not in carrier injection in its accepted sense (as used by Shirane too). The combination of Fan with Shirane's three-layer structures will still not be enabling with respect to how the local contact to a single micro-cavity is actually made. Note that Shirane does not disclose a local contact to a single micro-cavity, but a line contact to an entire waveguide. Thus Shirane in combination with Fan cannot render unpatentable the present invention even in the old formulation of the claims.

As mentioned, while traversing the Examiner's § 102(b) and § 103 rejections, the Applicant is providing a set of new claims with the aim of expediting allowance. In view of the above amendments and remarks, it is respectfully submitted that claims 36 and 40 are in condition for allowance by virtue of answering the Examiner's objection. Claims 37-39 and 41, 42 are in condition for allowance through their dependence of allowable main claims. Applicant further submits that claims 43-55 are

in condition for allowance, because they recite features not anticipated or rendered obvious by the prior art. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,



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